

## Organic Carbon in Whatman-QMA field-blanks

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Guideline EN-12341 prescribes the use of quartz fibre filters in the reference sampling of PM<sub>10</sub>. It is well-known that quartz fibre filters exhibit artefacts. They take up volatile OC during sampling and may lose semi-volatile OC (Turpin et al. 2000). Adsorption is in general the most important artefact.

A large number of samples has been taken by now in EU counties with quartz fibre filters over the years and the OC-artefact must have lead to an appreciable artificial increase in the amount of PM<sub>10</sub>. However, searching for information we could not find data on the importance of this artefact.

A minimum value for the adsorption artefact may be provided by the so-called field blanks. These are filters that are put in the sample holders without being loaded. The filters take up OC via diffusion.

The networks in the US report field blanks that are large in comparison with the actual OC-data. Only some scattered data are available in Europe (e.g., Vecchi et al. 2009).

Filters as received from the manufacturer often contain OC and they are therefore cleaned by pre-firing in scientific studies. The commonly used Whatman-QMA filters are pre-fired in the factory, according to information from the manufacturer.

In order to assess the current uncertainties around field blanks and lot-blanks in the PM-studies in the Netherlands we performed a dedicated study on the two types of blanks with Whatman-QMA filters as used in the national reference sampling for PM<sub>10</sub>.

### Field blanks

The study was part of a one-year investigation to assess the composition of PM in the Netherlands at regional and urban/kerb sites. Filter sampling was performed with automated reference samplers (KFG-Leckel) on 47 mm Whatman-QMA filters. Field blanks were filters that were in the Leckel filter carousels.

There are two carousels, one with the fresh filters from which every day a new filter is shifted into the filter holder. After sampling the filter is moved to a second carousel. 150 field blanks were taken evenly distributed between the two carousels and over the stations.

Analysis of the set of field blanks showed quite a variation in the OC-values. The average was 68 ug with an SD of 31 ug. The mentioned value for a total filter corresponds to a concentration of OC of 1.3 ug m<sup>-3</sup>. This translates into a value of Organic Matter (OM) of close to 2 ug m<sup>-3</sup>.

There was no systematic difference in the blanks from the urban sites versus those from the three regional sites, which seems to indicate that the filters are saturated with OC. This could imply that the field blanks can serve as a proxy for the adsorption artefact during sampling.

### Lot blanks

In addition to the field blank we made a study of the "lot"-blanks, i.e., Whatman-QMA as received from the factory. These "lot"-blanks were taken from batches that were unsealed immediately before analysis. Filters from three batches were analysed.

It was consistently observed that filters from the top of a stack contained high OC values. These values were higher than the average field blank.

Further down the stack of filters the values rapidly decreased. In two of the batches these were still appreciable with an average value of 25 ug, but in one batch the values were at the detection limit of 3 ug.

The bottom filters had (again) higher values.

### Addendum: blanks for NO<sub>3</sub>, SO<sub>4</sub> and NH<sub>4</sub>

The average value in the (150) field blanks was resp. 1.1%, 2.1% and 0.7% of the average value in the actual samples.

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Turpin et al., (2000). *Measuring and simulating particulate organics in the atmosphere: problems and prospects*. Atmos. Environ. 34, 2983-3013

Vecchi et al. (2009). *Organic and inorganic sampling artefacts assessment*. Atmos. Environ. 43, 1713-1720